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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/772,882      | 02/05/2004  | Adam William Saxler  | 5308-389            | 8522             |

20792 7590 12/30/2005

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RALEIGH, NC 27627

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| EXAMINER |
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JACKSON JR, JEROME

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| ART UNIT | PAPER NUMBER |
|----------|--------------|

2815

DATE MAILED: 12/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                |                                      |   |
|------------------------------|--------------------------------|--------------------------------------|---|
| <b>Office Action Summary</b> | Application No.<br>10/772,882  | Applicant(s)<br>SAXLER, ADAM WILLIAM |   |
|                              | Examiner<br>Jerome Jackson Jr. | Art Unit<br>2815                     |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2005.
- 2a) ☐ This action is **FINAL**.      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 21-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 31-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/5/4, 7/2/4, 8/30/4, 1/27/5, 10/25/4</u> | 6) <input type="checkbox"/> Other: _____  |

Claims 21-30 are withdrawn from further consideration pursuant to 37 CFR

1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 10/20/05.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-20,31-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's prior art admissions (figures 14 and 15) "APA" or Adesida et al in view of Chen et al, Wang et al, and Eastman '680 .

According to "APA" and Adesida GaN based HEMTs are desirable for high temperature, high frequency, and high power properties compared with GaAs or InP based devices.

"APA" and Adesida describe HEMT devices formed from the AlGaInN material system. The difference between "APA" and Adesida and applicant is the inclusion of an energy barrier to improve device performance. This difference is not patentable as these energy barriers were known and practiced in other HEMT devices and it would have been prima facie obvious to have practiced such energy barriers in AlGaInN based HEMT devices for the same advantages. See Chen, Wang and Eastman where energy barriers are practiced for better carrier confinement, better breakdown, and improved device performance. See particularly Chen figure 1 where an n+/i/p+ "energy barrier"

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structure is below the channel region. In regard to claims reciting depletion of the energy barrier and “proximity” of n and p layers see Eastman.

The limitations in dependent claims that are not expressly disclosed in the applied art are considered inherent or obvious to those of ordinary skill. For example the limitations of “about 0.5V”, “about 1V” or “about 2V” are considered inherent or obvious device design to one of ordinary skill. Any implied or recited material compositions regarding AlInGaN are considered inherent or obvious design choices over Adesida and the applied art to one of ordinary skill in the art as the recited compositions are broadly claimed.

Claims 31 and 32 are rejected under 35 U.S.C. 102(a) as being anticipated by Chang et al JJAP 6/03.

Chang shows an AlGaN based HEMT with an energy barrier of Mg doped GaN. Claims 31 and 32 are broad and do not structurally distinguish over Chang.

Claims 1-20 and 31-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA or Adesida with Chen, Wang, and Eastman, above, and further in view of Chang.

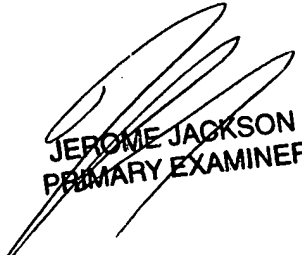
In cumulative support of the suggestion of an “energy barrier” for GaN based devices, Chang shows a p-doped energy barrier in a GaN based device. Together the references suggest a p+/n+ type energy barrier for better carrier confinement, power advantages etc.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerome Jackson Jr. whose telephone number is 571-272-1730. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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JEROME JACKSON  
PRIMARY EXAMINER